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CLAIMS

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- 1. Composition comprising: a biodegradable gelbased matrix, at least one active agent and stem cells able to differentiate into cardiac tissue.
- 2. Composition according to claim 1 wherein the biodegradable gel-based matrix is made of fibrin or proteoglycans or polysaccharides.
 - 3. Composition according to claim 1 wherein the biodegradable gel-based matrix has an elasticity expressed in E-Modulus of 30-80 kPa.
- 4. Composition according to claim 1 wherein the biodegradable gel-based matrix has a water content of 90 to 95%.
 - 5. Composition according to claim 1 wherein the active agents are chosen in the group consisting of: growth factors, cytokines, bioactive molecules.
 - 6. Composition according to claim 5 wherein the active agents have an alpha2-plasmin inhibitor sequence in their N-terminus.
- 7. Composition according to claim 5 wherein the growth factors are chosen in the group consisting of: vascular endothelial growth factor (VEGF), epidermal growth factor (EGF), plateled-derived growth factor (PDGF), transforming growth factor beta (TGF β), insuling growth factor 1 (IGF1), placental growth factor (PLGF), keratinocyte-derived growth factor (KDGF).
 - 8. Composition according to claim 5 wherein the cytokines are chosen from the group consisting of interleukin 6 (IL-6) family, soluble c-kit ligand (s-kitL) and cardiotrophin-1.
- 9. Composition according to claim 8 wherein the

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cytokines of IL-6 family are: IL-6, leukemia inhibitory factor (LIF).

- 10. Composition according to claim 5 wherein the bioactive molecules are chosen in the group consisting of: beta-blockers and thymosin $\beta 4$.
- 11. Composition according to claim 1 wherein the stem cells able to differentiate to cardiac tissue are embryonic, fetal or adult stem cells.
- 12. Composition according to claim 11 wherein the stem cells are endothelial progenitor cells (EPCs), mesenchymal stem cells, or monocytes.
 - 13. Composition according to claim 12 wherein the stem cells are isolated from bone marrow or cord blood or peripheral blood or the heart.
- 14. Use of the composition according to claims from 1 to 13 for the preparation of a medicament for the treatment of heart failure due to myocardial infarction.
- 15. Medicament according to claim 14 characterized in that it is under the form of a patch.
 - 16. Method for the preparation of the medicament according to claim 15 comprising the following steps:
 - a) forming a gel substrate of claim 2;

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- b) admixing to the gel substrate of step a) active agents of claims 5 to 10;
 - c) seeding stem cells of claim 11 on the gel substrate of step b);
 - d) cultivating cells of step c) for up to 14 days in order to allow cell differentiation;
- e) steps a-d can be repeated sequentially in order to obtain a multi-layer gel assembly.

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- 17. Lentiviral vector modified from pLenti6/BLOCK-iT-DEST comprising cPPT= central polypurine tract cassette, cardiac-specific promoter inserted in a multiple cloning site, a gene of interest, w= woodchuck cassette, EM7 constitutive promoter, blasticidin resistance gene.
- 18. Lentiviral vector modified from pLenti6/BLOCK-iT-DEST according to claim 17 wherein the cardiac-specific promoter is constitutive or cardiac specific.
- 19. Lentiviral vector modified from pLenti6/BLOCK-iT-DEST according to claim 17 wherein the gene of interest is EGFP, CSX, MEF2C and hWnt11.
 - 20. Embryonic stem cells according to claim 11 transduced with a Lentiviral vector of claims 17,18,19.
- 15 21. Method for the density-based separation of cells of claim 11 comprising the following steps:
 - a) enzymatic dissociation of cells;
- b) separation of cardiogenic cells and cardiac cells by centrifugation on 2 different Percoll gradients where the first gradient is composed by a bottom layer having a density of 1.09 and a top layer having density of 1.05 and the second gradient is composed by a bottom layer of 1.09 and a top layer having density of 1.07.